ALPHA® NR-330

VOC-FREE NO-CLEAN FLUX

DESCRIPTION

ALPHA NR330, former lab development #9225, is a VOC-free halide-free, rosin/resin-free, low solids no-clean flux which provides the highest activity of any VOC-free Bellcore compliant flux for defect-free soldering. It is formulated with a proprietary mixture of organic activators which deliver excellent wetting and top-side hole fill, even with OSP coated bare copper boards which have undergone prior thermal excursions. Several proprietary additives are also formulated into **ALPHA NR330** which act to reduce the surface tension between the solder mask and the solder; thereby, dramatically reducing the tendency of solderball generation. The formulation of **ALPHA NR330** is also designed to be more thermally stable; thereby, reducing the occurrence of solder bridging.

FEATURES & BENEFITS

- Bellcore compliant for assemblies requiring this standard.
- VOC-free to help meet air quality regulations.
- Exceptional wetting for excellent hole-fill even with organically coated bare copper boards, with prior reflows.
- Thermally stable activators provide low solder bridging.
- Reduces the surface tension between solder mask and solder to provide low solderball frequency.
- Very low level of non-tacky residue to reduce interference with pin testing and good board cosmetics.
- Suitable for use with lead-free alloys such as 99.3Sn/0.7Cu and 96.5Sn/3.5Ag.

APPLICATION

PREPARATION - In order to maintain consistent soldering performance and electrical reliability, it is important to begin the process with circuit boards and components that meet established requirements for solderability and ionic cleanliness. It is suggested that assemblers establish specifications on these items with their suppliers and that suppliers provide Certificates of Analysis with shipments and/or assemblers perform incoming inspection. A common specification for the ionic cleanliness of incoming boards and components is 5µg/in^2 maximum, as measured by an Omegameter with heated solution.

Care should be taken in handling the circuit boards throughout the process. Boards should always be held at the edges. The use of clean, lint-free gloves is also recommended.

Conveyors, fingers and pallets should be cleaned. Bioact SC-10 Solvent Cleaner has been found to be very useful for these cleaning applications.

FLUX APPLICATION - NR330 is formulated to be applied by spray method. When spray fluxing, the uniformity of the coating can be visually checked by running a piece of cardboard over the spray fluxer or by processing a board-sized piece of tempered glass through the spray and then through the preheat section.

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GENERAL GUIDELINES FOR MACHINE SETTINGS

OPERATING PARAMETER	TYPICAL LEVEL
Amount of Flux Applied	Spray: 500 - 1000 µg/in^2 of solids
Top-Side Preheat Temperature	210 - 235°F (99 - 113°C)
Bottomside Preheat Temperature	0 to +40°F (0 to +22°C) vs. Top-Side
Recommended Preheat Profile	Straight ramp to desired top-side temperature
Maximum Ramp Rate of Topside Temperature (to avoid component damage)	2°C/second (3.5°F/second) maximum
Conveyor Angle	5 - 8° (6° most common)
Conveyor Speed	3.5 - 6.5 feet/minute (1.0 - 1.8 meters/minute)
Contact Time in the Solder (includes Chip Wave and Primary Wave)	1.5 - 4.0 seconds (2½ - 3 seconds most common)
Solder Pot Temperature:	
Sn63/Pb37 Alloy	460 - 500°F (235 - 260°C)
Lead-Free Alloys (99.3Sn/0.7Cu, 96.5/13.5Ag, Sn/4.0Ag/0.5Cu)	500 - 550°F (260 - 290°C)
These are general guidelines which have proven to yield excellent results; however, depending upon your equipment, components, and circuit boards, your optimal settings may be different. In order to optimize your process, it is recommended to perform a design experiment, optimizing the most important variables (amount of flux applied, conveyor speed, topside preheat temperature, solder pot temperature and board orientation).	

FLUX SOLIDS CONTROL - If rotary drum spray fluxing, the flux solids will need to be controlled via thinner addition, in this case DI water, to replace evaporative losses of the flux solvent. As with any flux with less than 5% solids content, specific gravity is **not** an effective measurement for assessing and controlling the solids content. The acid number should be controlled to between 36.0 and 40.0. Alpha's Flux Solids Control Kit #3, a digital titrator, is suggested. Request Alpha's Technical Bulletin SM-458 for details on the kit and titration procedure. When operating a rotary drum fluxer continuously, the acid number should be checked every eight hours. Over time, debris and contaminants will accumulate in recirculating type flux applicators. For consistent soldering performance, dispose of spent flux every 40 hours of operation. After emptying the flux, the reservoir should be thoroughly cleaned with DI water.

RESIDUE REMOVAL - NR330 is a no-clean flux and the residues are designed to be left on the board. However, if desired, NR330 residues can be removed with hot water.

TOUCH-UP/REWORK - Use of the Cleanline Write Flux Applicator with NR205 flux and Telecore Plus cored solder is recommended for hand soldering applications.

SAFETY

Please refer to the Material Safety Data Sheet as the primary source of health and safety information. Inhalation of the volatilized flux activator fumes which are generated at soldering temperatures may cause headaches, dizziness and nausea.

Suitable fume extraction equipment should be used to remove the flux from the work area. An exhaust at the exit end of the wave solder machine may also be needed to completely capture the fumes. Observe precautions during handling and use. Suitable protective clothing should be worn to prevent the material from coming in contact with skin and eyes.

STORAGE

The storage temperature for **ALPHA NR330** is 0 - 25°C to prevent phase separation. Keep from freezing.

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TECHNICAL DATA

Physical Properties	Typical Values	Parameters/Test Method	Typical Values
Appearance	Clear, Colorless Liquid	pH	2.35
Solids Content, wt/wt	4.0	Recommended Thinner	DI Water
Specific Gravity @ 25°C (77°F)	1.013 ± 0.003	Shelf Life	18 months
Acid Number (mg KOH/g)	38.0 ± 2.0	Container Size Availability	1, 5 and 55 Gal.
Flash Point (T.C.C.)	NONE	IPC J-STD-004 Designation	ORL0

CORROSION AND ELECTRICAL TESTING

CORROSION TESTING

Test	Requirement for ORL0	Results
Silver Chromate Paper[2] IPC-TM 650 Test Method 2.3.33	No detection of halide	Pass
Copper Mirror Tests[2] (Modified IPC/Bellcore Method)	No complete removal of copper	Pass
Copper Corrosion Test IPC-TM 650 Test Method 2.6.15	No evidence of corrosion	Pass

J-STD-004 SURFACE INSULATION RESISTANCE

Test	Conditions	Requirements[3]	Results[3]
"Comb-Down" Uncleaned	85°C/85% RH, 7 days	> 1.0×10^{8} Ω	6.8×10^{8} Ω
"Comb-Up" Uncleaned	85°C/85% RH, 7 days	> 1.0×10^{8} Ω	2.4×10^{9} Ω
Control Boards	85°C/85% RH, 7 days	> 1.0×10^{9} Ω	2.4×10^{10} Ω
IPC Test Condition (per J-STD-004A): -50V, measurement @ 100V/IPC B-24 board (0.4mm lines, 0.5mm spacing).			

BELLCORE SURFACE INSULATION RESISTANCE

Test	Conditions	Requirements[3]	Results[3]
"Comb-Down" Uncleaned	35°C/85% RH, 5 days	> 1.0×10^{11} Ω	2.3×10^{12} Ω
"Comb-Up" Uncleaned	35°C/85% RH, 5 days	> 1.0×10^{11} Ω	1.9×10^{12} Ω
Control Boards	35°C/85% RH, 5 days	> 2.0×10^{11} Ω	3.0×10^{12} Ω
Bellcore Test Condition (per GR 78-CORE, Issue 1): 48 Volts, measurement @ 100V/25 mil lines/50 mil spacing.			

BELLCORE ELECTROMIGRATION

Test	SIR (Initial)[3]	SIR (Final)[3]	Requirement	Result	Visual Result
"Comb-Up" Uncleaned	4.3×10^{8} Ω	4.2×10^{10} Ω	SIR (Initial)/SIR (Final) <10	Pass	Pass
"Comb-Down" Uncleaned	1.4×10^{9} Ω	2.5×10^{10} Ω	SIR (Initial)/SIR (Final) <10	Pass	Pass
Bellcore Test Condition (per GR 78-CORE, Issue 1): 65°C/85% RH/500 Hours/10V, measurement @ 100V/IPC B-25B Pattern (12.5 mil lines, 12.5 mil spacing).					

[2] **Copper Mirror** and **Silver Chromate Paper** tests were performed using flux sample prepared by reconstituting with isopropyl alcohol after evaporation of its water vehicle at 80°C for one hour as per footnote 1 of table 5, page 8 of J-STD-004. [3]All values shown are in ohms.